Analysis of Supply Chain in Investment Activity in the Russian Agricultural Complex

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Abstract- **The article analyzes supply chain in investment attractiveness and capital supply chain in investments in the Russian agro-industrial complex. The authors analyze the current state of the Russian agro-industrial complex, study supply chain in investments in fixed assets in the agricultural sector, and identify the growth rates of the components of GDP production. A supply chain forecast is carried out until 2024, and the share of supply chain strategies of agriculture markets in fixed assets to gross domestic product is also forecasted. In addition, the article reviews the structure of the components of gross domestic product in order to identify supply chain strategic directions for ensuring the country's food security.**

Keywords: *agro-industrial complex, state supply chain in investment policy, supply chain in investment policy, supply chain in investment, Russian agriculture..*

1. Introduction

At the current stage of development of the Russian economy, the agro-industrial complex is recognized as a complex organizational and economic structure, which consists of integrally dependent sub-sectors and specific types of activities, such as production, harvesting, processing, storage and distribution of agricultural products (Stabilization and Development of Agricultural Production in the Russian Federation for 1996–2000, 1996) Therefore, one of the urgent problems of any country is to ensure the effective operation of all structural elements included in the agro-industrial complex. Furthermore, an efficiently functioning agro-industrial complex is the guarantor of food security of the country and its regions. Thus, the country needs not only to regulate the activities of all sub-sectors of the agro-industrial complex, but also financially support this sector of the economy through cross-sectoral supply chain in investment. In order to conduct such a process competently it is necessary to develop a methodologically sound concept for identifying priority sub-sectors to support.

The objective of the article is to improve the methodological aspects of investing in the Russian agro-industrial complex in the context of improving the functioning of sub-sectors by modernizing capital funds. Thus, the main function of the article is to analyze and evaluate the intrinsic nature of capital assets in the agro-industrial complex and to identify the impact of supply chain in investments on their effectiveness.

The agro-industrial complex is a comprehensive system of mutually connected sectors of the economy, which perform different functions, but have an integrated-dependent nature [1].

The essence of an integrated-dependent nature lies in the fact that agricultural products pass an entire production chain: cultivation, harvesting, processing, storage and distribution. Thus, the agro-industrial complex includes not only agriculture, but also the service (the processing) industries. All these sectors require the availability of capital assets in the form of various equipment, combines, tractors, grain harvesting machines, pesticides, fertilizers, new plant varieties and the best cattle breeds.

In view of the foregoing, the agro-industrial complex can be represented as a system formed by interrelated elements:

The first element includes sectors serving Russian agriculture, for example, agricultural engineering, basic chemistry, breeding, melioration [2].

The second element includes agricultural sector, namely crop production and livestock. Examples of industries are plant growing, viticulture, fishing, sheep breeding, beekeeping.

The third one includes sectors processing agricultural products, for example, the food industry, sugar industry, light or textile industry, and trade.

All these elements are vitally important and constitute the guarantor of food security for any country, including Russia, hence research in this area is relevant. In Russia, these issues were dealt by such scientists as [3-5].

Among foreign researchers who formed the theoretical basis and methodological principles of ensuring food security, we can [7]. According to them, food security is considered one of the main indicators of the socio-economic development of the country. Thus, the global analysis and ranking countries by food security “The Global Food Security Index” is conducted by large research companies around the world. The most famous is The Economist Intelligence Unit, an analytical department of The Economist (British journal) supported by the American multinational company Dupont. The Economist Intelligence Unit was founded in 2012 and nowadays provides the most comprehensive set of food security indicators for various range of countries of the world.

Russia has always paid great attention to food security issues, but since 2014 they have become much more acute due to the imposition of sanctions by some foreign countries and the United States. Thus, the Russian Government has elaborated the following documents: The Concept of Food Security of the Russian Federation [8]; The National Security Strategy of the Russian Federation

up to 2020 (Decree of the President of the Russian Federation of 05/12/2009, No. 537), which employs different approaches to the main directions of ensuring food security. These documents determine that the guarantor of food security of the country is the reduction of costs and improving the quality of agricultural raw materials and food products. Scientists from all over the world have proved that it is possible to achieve improved food quality by modernizing fixed assets, which in turn leads to increased profitability and competitiveness of the agricultural industry. However, such results can be achieved by improving the technical and organizational level of agricultural producers, which certainly requires additional supply chain in investment resources. Most agricultural producers do not have enough own resources to increase their innovative organizational level and cannot obtain loans provided by commercial banks due to high interest rate. Therefore, for the full and effective functioning of the domestic agro-industrial complex, it is necessary to develop and implement a comprehensive supply chain in investment policy, both at the federal and the regional levels.

Material and Methods

The study methodology is based on theoretical aspects and practice of Russian economists on the topic under study and includes such methods as the monographic method, analysis of obtained statistical data method of etc.

A statistical analysis of data made it possible to identify the dynamics of capital supply chain in investments in the Russian agro-industrial complex in the article. A study of the problem was conducted, based on the monographic method. The results of the study are graphically presented and show diagrammatic shifts in the sectoral structure of supply chain in investments, conclusions are drawn.

Results and Discussion

A comprehensive supply chain in investment policy in the agricultural sector is determined by the effectiveness of each of the functional stages, as well as the coherence and integration interaction between them. It should focus on solving problems of the country's economic security by stimulating agricultural growth. (On Ensuring Food Security of the Russian Federation: Proceedings of a Meeting of the Security Council of the Russian Federation)

Supply chain in investment policy at the conceptional level seems like a system of interacting elements that represent the objectives, methods and directions of policy implementation (Fig. 1).

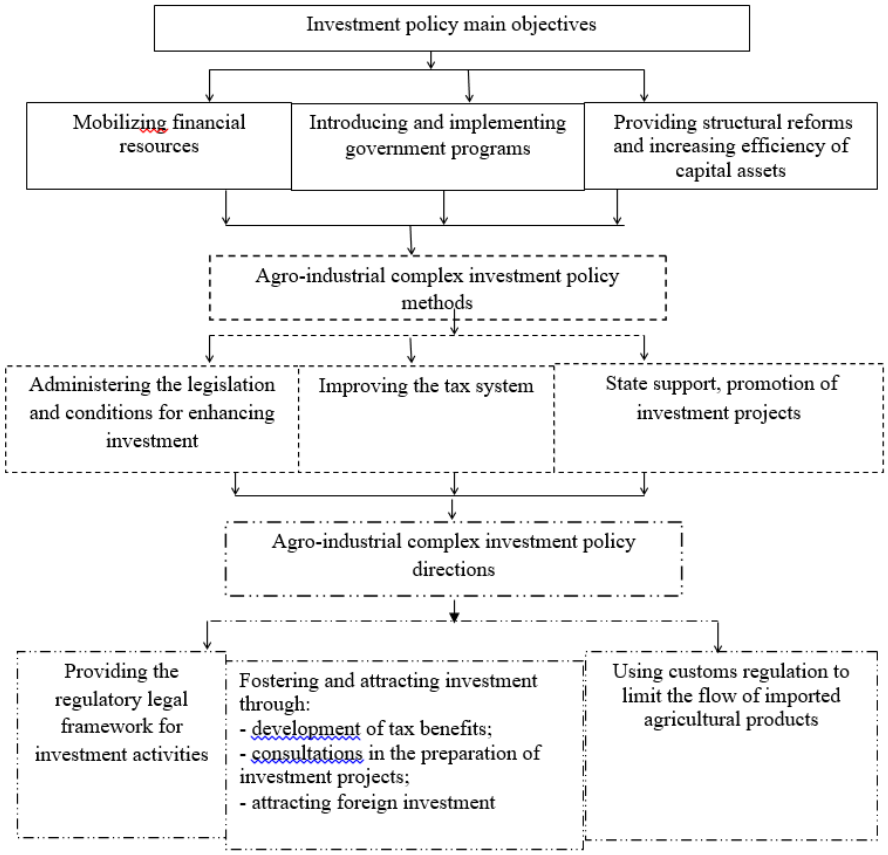


Figure 1 - Conceptual chart of an agro-industrial complex supply chain in investment policy

It can be seen from the presented chart that the methods and directions for implementing the supply chain in investment policy are diverse. However, one of the lesser-used elements of supply chain in investment policy is the attraction of foreign capital. Today, the prospects for foreign investors are very promising.

Notwithstanding this, however, foreign investors are reluctant to invest their capital in the Russian economy, including in the agricultural sector. The main reasons are not only conditions of sanctions announced by the EU, but also the lack of real benefits and privileges for foreign capital. In this regard, it is advisable for government bodies to review the existing legislation and develop a special regulatory framework for supply chain in investment activities by foreign countries. In order to stimulate foreign investors it is necessary to introduce new laws on supply

chain in investment activities, develop a system of state guarantee measures, create mechanisms and tools to ensure the supply chain in investment attractiveness of the industry, establish tax incentives such as reduced tax rates for agricultural enterprises, which use foreign capital; provide the opportunity to co-finance from state sources.

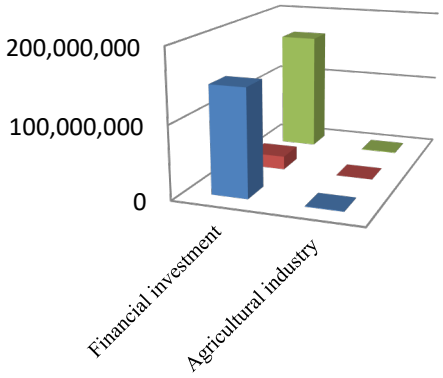
Currently the dynamics of supply chain in investment activity in the Russian agro-industrial complex is positive, but the pace of its development leaves much to be desired. Table 1 presents the amount of supply chain in investment infusion over the years by sectors of the agro-industrial complex.

Table 1 - Supply chain in investments in fixed assets in the agro-industrial complex, billion rubles (in actual prices) (Russia in figures, 2019)

Type of activity	Measure	2014	2015	2016	2017	2018
Supply chain in investment in fixed assets in total - of them:	bln rubles	13902.6	13897.2	14748.8	16027.3	17595.0
	%	100	100	100	100	100
	% of the previous year's level (in comparable prices)	98.5	89.9	99.8	104.8	104.3
agriculture, forestry, hunting, fishing and fish farming	bln rubles	524.3	518.8	623.4	705.5	777.0
	%	3.8	3.7	4.2	4.4	4.4
	% of the previous year's level (in comparable prices)	92.4	87.9	112.5	109.7	105.5
plant growing and animal husbandry, hunting and the provision of related services in these areas	bln rubles	492.5	483.6	582.6	651.4	707.7
	%	3.6	3.5	4.0	4.1	4.0
	% of the previous year's level (in comparable prices)	92.7	87.4	113.1	108.2	104.1
forestry and logging	bln rubles	16.6	20.8	20.7	25.4	31.1
	%	0.1	0.1	0.1	0.1	0.2
	% of the previous year's level (in comparable prices)	80.4	109.1	90.7	119.6	116.7
fishing and fish farming	bln rubles	15.2	14.4	20.1	28.7	38.2
	%	0.1	0.1	0.1	0.1	0.2
	% of the previous year's level (in comparable prices)	103.0	78.8	125.5	139.6	127.7

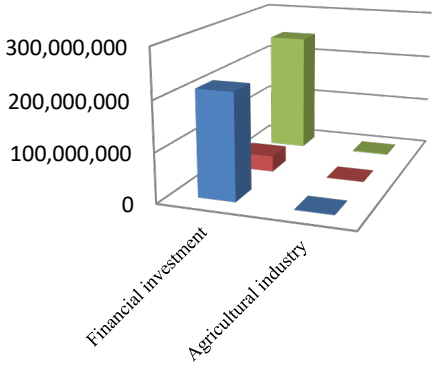
For a clearer understanding of the essence of what is happening in supply chain in investment activities in relation to the agro-industrial complex, we will present data on financial supply chain in investments in the agro-industrial complex (Fig. 2) and supply chain in investment injections by foreign investors.

2017 г.



	Financial investment	Agricultural industry
Short-term investments	147,082,676	833,534
Long-term investments	18,586,505	11,250
In total	165,669,181	944,784

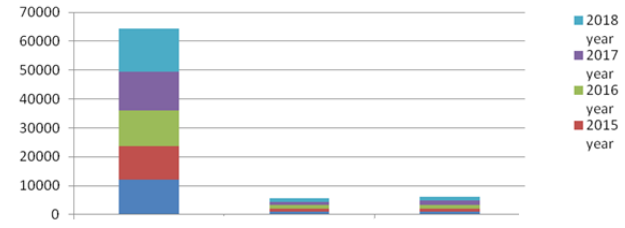
2018 г.



	Financial investment	Agricultural industry
Short-term investments	213,867,310	1,224,247
Long-term investments	32,636,074	140,073
In total	246,603,384	1,364,320

Figure 2 - Capital supply chain in investments in the Russian agro-industrial complex, million rubles

The results of the study show that, despite the sanctions restrictions introduced in 2014, the influx of foreign supply chain in investment is increasing (Fig. 3). Nevertheless, to attract foreign supply chain in investment more intensively, joint supply chain in investment projects should be developed and implemented, where the conditions for project financing will be reflected as a mandatory item. At the stage of developing an supply chain in investment project, it is necessary to justify all scientific, technical, technological, organizational and economic measures.



	Russian	Foreign	Joint Russian and foreign	Total
2018 year	15056.9	1100.9	1437.2	17595.0
2017 year	13426,8	1192.4	1408.1	16027.3
2016 year	12251.7	1098.6	1398.6	14748.8
2015 year	11720.5	1147.1	1029.6	13897.2
2014 year	11975.6	975.8	951.2	13902.6

Figure 3 - Supply chain in investments in fixed assets by ownership, billion rubles.

At the implementation stage, the contractual approach consists in a balanced allocation of material and monetary resources for the individual stages of the supply chain in investment project from each side. An supply chain in investment project should include the formulation of an innovative idea and finding a niche market, forecasting consumer requirements for the quality and properties of products, as well as its environmental security. Thus, a joint discussion, development and implementation of all stages of an supply chain in investment project will contribute to a cardinal increase in socio-economic results [7-10].

The need for the implementation of joint supply chain in investment projects in the Russian agro-industrial complex will substantiate the forecasted volume of production of agricultural and food products based on the current internal and external trends, as well as the outlook for the world economy and foreign economic conditions for the next 5 years (Forecast of Social and Economic Development of the Russian Federation up to 2024).

Economic development forecast can be conducted in three scenarios - basic, target and conservative. The basic scenario is the simplest when forecasting, when the dynamics of indicators are considered, and these dynamics is projected onto future forecast values. In the target scenario, targets that need to be achieved for a certain period are set. As for the conservative scenario, in contrast to the basic scenario, the existing dynamics is projected onto the forecast period in the context of the negative development of the external economic situation. In this case, it is assumed that global economic growth will slow down to 2%, which means the onset of a global recession and the conjuncture of world commodity markets is becoming unfavorable.

For more accurate forecasting, considering foreign economic risks, it is advisable to use the conservative method, which will limit the reaction of internal economic processes to fluctuations in the external economic situation. Fig. 4 presents a diagram of the growth rates of the agribusiness sectors in the context of changes in gross domestic product (GDP). It should be noted that inflation remains near the target level.

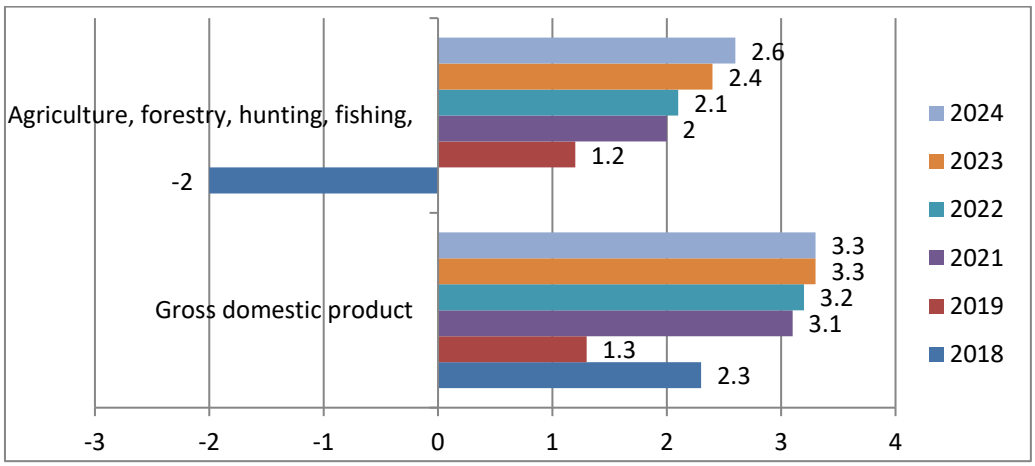


Figure 4 - The growth rate of the components of GDP, % to the previous year

As a result of predictive calculations, it can be assumed that the growth rate of sectors in the agro-industrial complex will contribute to the redistribution of employment from labor-intensive sectors with low wages (such as trade, a number of manufacturing industries, and transport) to the agricultural sector, which once again proves the need for supply chain in investment in development of agro-industrial complex.

Active supply chain in investment in the economy creates the basis for the growth in demand for labor and, accordingly, for the growth of incomes of the population. By activating one indicator, we bring another one into a more intensive movement, therefore, labor productivity will increase animatedly, which will be facilitated by the widespread introduction of technological innovations - first of all, artificial intelligence technologies, robotics, the Internet of Things, as well as increased use of platform solutions in different sectors of the economy . In this regard, structural changes will occur in the sectoral structure of supply chain in investments (Fig. 5).

In order to provide the implementation of the supply chain in investment policy in the agro-industrial complex for achieving the predicted production volumes of agricultural and food products, the creation of a favorable environment for supply chain in investment growth is a necessary condition. A wide range of measures aimed at attracting supply chain in investment in the agricultural sector is proposed in the state program for the development of agriculture and the regulation of agricultural markets, raw materials and food. It is planned that, when implementing this program, the share of supply chain in investment in fixed assets to gross domestic product will increase by 5% (Fig. 6).

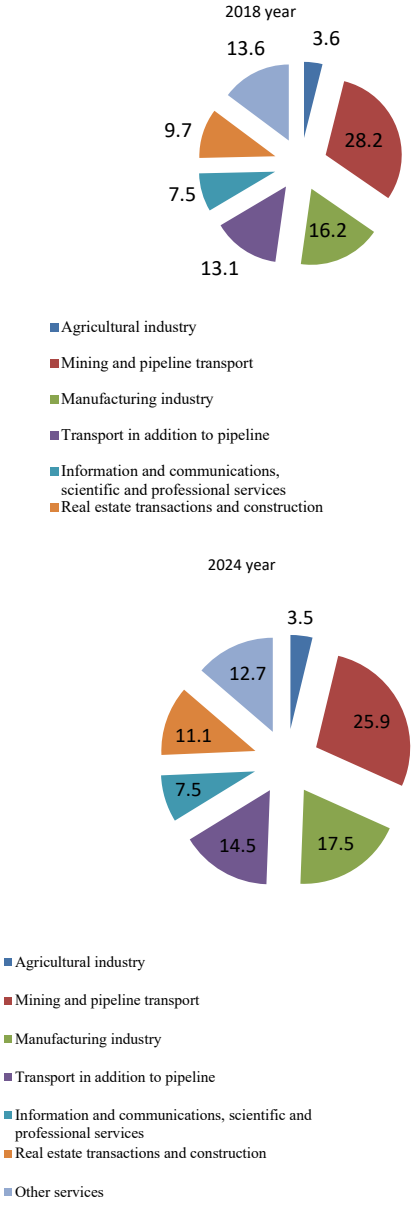


Figure 5 - Forecasted changes in the sectoral structure of supply chain in investments

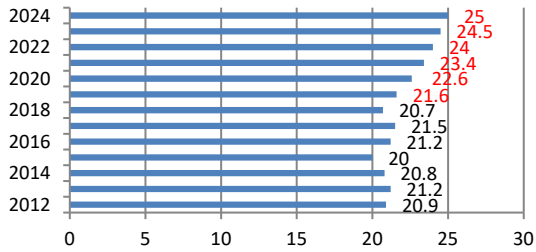


Figure 6 - Share of supply chain in investments in fixed assets to Gross Domestic Product

If we consider the forecasted values from the implementation of the state program in the context of the agricultural sectors, we will see positive changes this year (Table 2).

Table 2 - Forecast indicators of production of the main types of agricultural products

The percentage of the corresponding period of the previous year	Actual data 2018	Assessment 2019	2020	2021	Forecast 2022	2023	2024	2024 to 2018,%
Agriculture	-0.6	1.6	1.7	1.8	1.9	2.1	2.3	12.0
Crop (after refinement)	-16.4	6.0	1.7	1.6	1.6	1.6	1.6	14.8
Sugar beet	-19.0	2.2	2.3	2.3	2.2	2.2	2.1	14.1
Sunflower	21.7	-2.0	3.2	0.8	0.8	3.1	1.5	7.4
Potatoes	3.2	1.8	0.0	0.0	0.4	0.0	0.0	1.8
Vegetables	0.5	4.5	2.1	1.4	0.7	0.7	0.7	10.3
Cattle and poultry (live weight)	2.5	1.8	2.0	2.0	1.9	1.9	1.8	12.1
Milk	1.5	1.5	1.6	1.6	1.7	1.4	1.5	9.7
Eggs	0.1	0.2	0.2	0.2	0.0	0.2	0.0	0.9
Food production	4.9	3.3	3.3	3.3	3.4	3.6	3.7	22.5
Solid white beet sugar	-5.5	2.8	1.6	1.6	1.6	1.6	-1.5	5.2
Unrefined vegetable oils	1.5	0.5	0.8	0.9	0.8	0.8	2.5	6.4
Meat and offal	5.2	0.8	1.0	1.1	1.0	0.8	1.1	6.0
Cheese, cheese products, cottage cheese	3.0	0.8	1.0	1.0	1.1	0.5	1.1	5.8

In 2019 the gross grain harvest is at the level of 6 million tons, which is associated with an increase in the sowing area and favorable agrometeorological spring conditions. Crop export is approximately 46 million tons, which is 16.4% lower than the level of 2018, in which the carry-over stocks of the record harvest of 2017 were sold.

In the future up to 2024, crop production will increase to 130 million tons due to increased yield and sowing area, which is 14.8% higher than the level of 2018. In 2019, sugar beet harvest increased by 2.2% compared to 2018. By 2024, the harvest of sunflower seeds is expected to reach 14.4 million tons (+ 12.8% by 2018). The growth in the production of vegetable oils is predicted to be 6.4% compared to the level of 2018 and reach 6.13 million tons.

In the medium term, the development of the livestock industry will be influenced by technological modernization, increasing production efficiency, reducing production costs, developing logistics and entering new export markets. In 2019, the growth in livestock and poultry production in live weight was 1.8% compared to 2018. By 2024, output will increase by 12.1% (The Ministry of Agriculture of the Russian Federation. Analytics).

The greatest efficiency of supply chain in investments in the agricultural sector is demonstrated by the leading agricultural regions of southern Russia. Of interest is the experience of the Rostov region, which showed the maximum increase and production per ruble of supply chain in investments in fixed assets of agricultural organizations. In other federal districts, the leaders in supply chain in investment efficiency are the Lipetsk, Kursk and Belgorod regions.

Belgorod region has a significant reserve of increasing the efficiency of agricultural production through the introduction of digital technologies in such industries as crop production, livestock, cattle breeding and others, and, consequently, the emergence of additional jobs, improving the economic climate [11-18].

Analyzing the forecast data, we project (Fig. 7) the forecast amount of agricultural production.

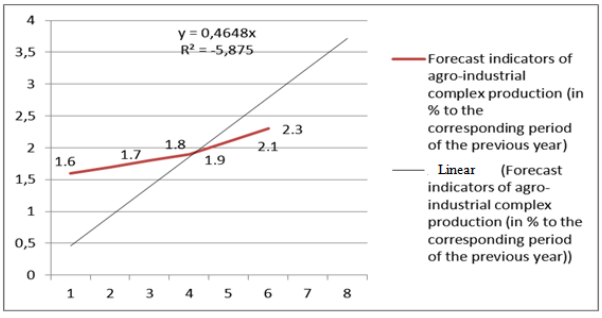


Figure 7 - Forecast indicators of agro-industrial complex production (in % to the corresponding period of the previous year)

Positive changes are observed in the volume of agricultural production, which is reflected in the formula and can be described by a linear dependence of the third order as follows:

The volume of agricultural production as a percentage
R2=-5,875; y=0,464x,
where y – level of total production (%);
x – temporal level of the series (at the end of the year).

Thus, with the growth of agricultural production, the task of finding possible markets comes to the fore, given the fact that there is a high saturation for most products in the domestic market, which leads to a drop in prices and decrease in profitability of the industry. Therefore, state support is needed not only to activate supply chain in investments in the agricultural sector, but also to expand the access of Russian products to foreign markets, including the Chinese market.

To expand the access of Russian agricultural products to foreign markets, it is advisable to provide constant feedback with foreign investors using a long-term horizon for planning and forecasting the effectiveness of supply chain in investment projects. This can be facilitated by the creation of a unified information system for the supply chain in investment potential of the Russian agro-industrial complex, which will help to solve several problems at once:

- improve the quality of supply chain in investment planning;
-increase the efficiency of industry management due to the possibility of identifying priority areas for supply chain in investment;
- ensure transparency and controllability of the allocation and use of state support for the industry;
- reduce the risks of project implementation through monitoring and early detection of problems.

As shown by the results of the study, supply chain in investments in the Russian agro-industrial complex in general demonstrate stable growth dynamics over the past three years. Investors highly evaluate the opportunities provided for the development of agribusiness and try to intensify the process of agro supply chain in investment in Russia.

Conclusion

The development of the agricultural sector in the Russian economy is still characterized as unstable, has gaps and weaknesses. The reason lies in the imbalance between supply chain in investment management systems and external economic conditions. To solve this problem, it is necessary to intensify the process of modernization of the agricultural sector. The modernization process requires the capital injection into the industry, with strict adherence to the entire supply chain in investment and production cycle in agriculture.

Research suggests that nowadays one of the important tasks of ensuring sustainable reproduction of the agro-industrial complex is to maintain the integrity of its supply chain in investment cycle, which consists in ensuring the unhindered movement of capital capacities from stage to stage [17]. Consequently, the innovation cycle reflects the specific objectives and nature of the combination of capital, labor and land resources, occupies a key position in the processes of forming the agro-industrial complex supply chain in investment policy. Thus, it is necessary to consider the multifunctionality of industries included in the single organizational and economic structure of the agro-industrial complex.

In order to ensure a single supply chain in investment cycle in the agro-industrial complex, it is necessary to analyze and study statistical data on these issues, forecast the necessary amount of agricultural and food production, attract foreign investors to activate the supply chain in investment process and expand the market.

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